REMARKS/ARGUMENTS

These remarks are made in response to the final Office Action of November 12, 2008 (hereinafter Office Action). As this response is timely filed within the 3-month shortened statutory period, no fee is believed due. The Office, however, is expressly authorized to charge any deficiencies or credit any overpayments to Deposit Account 50-0951.

Claims Rejections – 35 USC § 101

Claims 19-20, 22-25, and 27-28 were rejected under 35 U.S.C. § 101 because it was asserted that the claimed invention is directed toward non-statutory subject matter. More specifically, it was asserted that the steps of claims 19-20, 22-25, and 27-28 are not tied to another statutory class (such as a particular apparatus) or transforms underlying subject matter to a different state or thing.

Independent Claims 19 and 24 have been amended to recite a computer-implemented method so as to tie the claims to another statutory class, namely a computer apparatus.

Applicants thus respectfully request that the claim rejections under 35 U.S.C. § 101 be withdrawn.

Claims Rejections – 35 USC § 103

Claims 19-20, 22-25, and 27-28 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent 6,421,672 to McAllister, *et al.* (hereinafter McAllister) in view of U.S. Patent 6,256,630 to Gilai, *et al.* (hereinafter Gilai).

Applicants respectfully disagree with the rejections and thus have not amended the claims to overcome the cited prior art.

Aspects of Applicants' Invention

It may be useful at this juncture to reiterate certain aspects of Applicants' invention. One embodiment of the invention, typified by Claim 19, is a method of disambiguating database search results within a speech interface.

The method can include, responsive to a database search, retrieving multiple database entries including a plurality of common data fields and processing the common data fields of the retrieved database entries according to predetermined disambiguation criteria. The predetermined disambiguation criteria can include excluding any data field having duplicate data items, excluding any data field having at least one data item that is unpronounceable, and excluding any data field having at lease one data item that exceeds a predetermined maximum length. See, e.g., Specification, page 5, line 29 to page 7, line 7 and page 7, line 29 to page 8, line 11.

The method also can include, based upon the processing, identifying from among the plurality of common data fields at least one disambiguation data field that satisfies the predetermined disambiguation criteria and selecting one disambiguation data field based on a predetermined selection criterion when more than one disambiguation data field is identified in the identifying step. See, e.g., Specification, page 7, lines 8-17 and page , lines 12-16.

The method further can include presenting, through the speech interface, data items corresponding to the selected disambiguation data field for each retrieved database entry, wherein the speech interface is used in conjunction with a system in which the database search is performed, and wherein the speech interface provides users of the system with an interface for searching for information contained within a database in which the database search was conducted and for audibly receiving results of the database search. See, e.g., Specification, page 5, line 29 to page 7, line 7 and page 7, line 29 to page 8, line 11.

The Claims Define Over The Prior Art

Speech interfaces are frequently used in conjunction with database-driven systems to provide users with a speech-based method of searching for information. One common example of such a system is a telephone directory system where a user can verbally specify an argument, such as a name, for which the speech-enabled system can search. Speech interfaces can work effectively in cases where a database search returns a single search result. If the search returns multiple search results, however, the search effectively fails unless the user is provided with an opportunity to select, or disambiguate, one search result from the multiple search results. Disambiguation within a visual environment can be accomplished with relative ease in comparison with disambiguation in an audio environment. In a visual environment, search results are displayed to the user so that the user then can make a selection. Disambiguation within a speech interface, however, can be problematic. Specifically, each search result is played to the user, data field by data field. Playing search results in this manner can result in a confusing and nonsensical playback of the search results. The search results effectively serve as long and confusing speech menu items which can be difficult for the user to remember when making a selection. Moreover, some data items can be unpronounceable by the speech interface. See Specification, page 1, lines 7-23.

One solution has been to play only search result contents from predetermined data fields in an effort to reduce speech menu item size. If, however, the selected data field includes duplicate data items among the search results, the search results cannot be disambiguated by the predetermined data field. In that case, the user hears what can sound like duplicate speech menu items, despite the fact that each speech menu item corresponds to a different search result. See Specification, page 1, lines 24-29.

The present invention provides a method for disambiguating multiple database search results. More specifically, the present invention can analyze database search results to determine a data field suitable for uniquely identifying each search result when presented through a speech interface. Accordingly, users can select a desired search

result without having to view a listing of the search results on a display. See Specification, page 2, lines 2-7.

One aspect of the present invention can include a method of disambiguating database search results. The method can include retrieving multiple database entries responsive to a database search. The retrieved database entries can include a plurality of common data fields. The retrieved database entries can be processed according to predetermined speech interface criteria. For example, data fields of the retrieved database entries which have common data items can be excluded from further processing, data fields of the retrieved database entries having pronounceable data items can be identified, and a data field from the plurality of common data fields having data items with a smallest average length can be determined. Additionally, a data field from the plurality of common data fields having data items which do not exceed a predetermined maximum threshold can be determined. Regardless, at least one data field from the plurality of common data fields can be selected for uniquely identifying each of the retrieved database entries. The data items corresponding to the selected data field for each retrieved database entry then can be presented through a speech interface. See Specification, page 2, lines 8-22.

Another aspect of the present invention can include a method of disambiguating database search results wherein multiple database entries can be retrieved responsive to a database search. The retrieved database entries can include a plurality of common data fields. The retrieved database entries can be processed according to predetermined speech interface criteria; and, at least one of the data fields from the plurality of common data fields can be selected which can uniquely identify each retrieved database entry. A query can be issued, for example to a user, to determine which one of the common data fields, which can uniquely identify each of the retrieved database entries, is to be used to disambiguate the retrieved database entries. The method further can include receiving a user input selecting one of the common fields which can uniquely identify each of the retrieved database entries. Another user input specifying a data item associated with the

selected data field can be received to disambiguate the retrieved database entries. Alternatively, data items associated with the selected data field automatically can be presented through a speech interface for each retrieved database entry. See Specification, page 2, line 23 to page 3, line 8.

It was asserted on pages 2-3 of the Office Action:

> *Applicant argues that McAllister does not teach excluding any data field having duplicate data items. Rather, in McAllister the data field having duplicate data items (such as the "name") is provided together with the data field having unique data items (such as the "address"). The examiner refers to pages 7-9, along with figures 1-2 of the specification of the current application, wherein a user initiates a search for the name "Joe Smith". Since "Joe Smith" is a duplicate name, according to the database of figure 1, the search proceeds within the database until a single record such as a location or job description is located, then the disambiguation result will be, i.e., Joe Smith, the programmer, located in Chicago. The examiner points out that this is the exact concept taught by McAllister. When McAllister's cannot distinguish "Joe Smith", the system proceeds to the address field to identify Joe Smith.*
>
> *Applicant argues that McAllister does not teach excluding data items that are unpronounceable. The examiner points out to McAllister's col. 4, lines 22-23 wherein he explicitly states eliminating unlikely pronunciations. Furthermore, determining whether data is pronounceable or not, and ignoring or excluding the unpronounceable one is well known in the art by using multiple techniques i.e. dictionary look up, and as evidenced by applicant, see specification, page 6, lines 11-15: "The search results further can be processed to determine whether the data items within the data fields accurately can be pronounced through a speech interface. Those skilled in the art will recognize that this determination can be made using any of a variety of techniques such as using a dictionary to lookup data items or analyzing the patterns of vowels and consonants of the data items."*
>
> *Applicant argues that Gilai does not teach excluding data fields having data items that exceed a predetermined maximum length. The examiner points out that Gilai generates a spellguess list. The selection of individual candidate strings depends on their own probability, and the probability declines as the length of the input string increases (col. 12, lines 13-46). Therefore, when the length of the input string reaches a threshold, the input string will not be considered. Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention was made to use Gilai's feature of eliminating or excluding data items that*

exceed a predetermined length and apply it to the disambiguation system of McAllister, in order to exclude those data field that exceed a predetermined length. Furthermore, excluding data fields having data items that exceed a predetermined maximum length is an inherent feature within the speech recognition/synthesis engine. If the length of a word exceeds the length of stored speech models within the database of a system, the system would not be able to recognize or pronounce that word, and by default, the long word will be excluded. McAllister discloses a speech recognition/synthesis engine (col. 2, lines 35-40; and col. 4, lines 61-67). Therefore, excluding data fields having data items that exceed a predetermined maximum length is inherently suggested by McAllister.

However, Applicants believe that neither McAllister nor Gilai nor their combination teaches the core of the present invention, namely a method for determining which field is best for disambiguation in a speech user interface, and more precisely a method for determining which field is best for disambiguating via additional speech input as opposed to output which is the focus of McAllister and what the Examiner has cited.

McAllister discloses in col. 3, lines 47-54:

The system would then provide the caller with both the name and location of the identified listings and ask the caller to select among the parties, typically by saying or using a keypad to input the number of the selection, e.g., "Say or push `1` to dial Robert Cook in Arlington, Virginia; `2` for the Robert Cook in Philadelphia, Pennsylvania; and `3` for Mr. Cook in Silver Spring, Maryland."

Clearly, in contrast to McAllister in which both data items in the data field with duplicate data items (the name) and data items in the disambiguation data field (the location) are presented, in the present invention only data items corresponding to the selected disambiguation data field are presented. Therefore, Applicants believe that McAllister does not disclose "selecting one disambiguation data field based on a predetermined selection criterion when more than one disambiguation data field is identified in the identifying step; and presenting, through the speech interface, data items

corresponding to said selected disambiguation data field for each said retrieved database entry", as recited in Claims 19 and 24 of the instant application.

McAllister discloses in col. 4, lines 22-26: "The system may further consider and eliminate unlikely pronunciations. For example, while the name spelled 'K-O-C-H' may be a potential candidate for the spoken name 'Cook', the converse is unlikely, i.e., a name pronounced 'Koch' would not be spelled 'C-O-O-K'."

However, it is noted that unlikely pronunciation is not the same as a data item being unpronounceable. For example, 'Koch' is a unlikely pronunciation for the name spelled 'C-O-O-K', but is perfectly pronounceable.

It is stated on page 6, lines 11-15 of the Specification of the instant application: "The search results further can be processed to determine whether the data items within the data fields accurately can be pronounced through a speech interface. Those skilled in the art will recognize that this determination can be made using any of a variety of techniques such as using a dictionary to lookup data items or analyzing the patterns of vowels and consonants of the data items." However, it is noted that although the techniques used for determining whether the data items within the data fields accurately can be pronounced may be known to those skilled in the art, the concept of excluding any data field having at least one data item that is unpronounceable is not known to those skilled in the art.

Gilai discloses in col. 12, Lines 13-46:

> c. *Output process 230--the N most probable strings are copied onto a digital storage medium such as computer memory. Preferably, the N most probable strings are retained as a heap sorted by their probabilities.*
> *For example, suppose that the numeric string "2874" is a keypad input to spellguess unit 30, which is intended by the caller to represent the name "BUSH". Spellguess unit 30 uses the method of FIG. 2 in order to produce a list of the most probable strings represented by the numeric string "2874", along with their probabilities.*
> *An example of such a list is as follows:(BURG, 0.1611), (BURI, 0.1259), (CURG, 0.1118), (BUSH, 0.1086), (CUSH, 0.1018), (CURI, 0.0874).*
> *As described in detail below, the probability of an individual candidate string is based on the probabilities of each trigram included in the string. For*

example, the probability assigned to BURG might be roughly the product of the known frequencies of occurrence of each of the following trigrams: BUR, URG.

The blocks of the recursive spellfinding process are now described in detail:

Block 150: "Minimum probability" is typically 0 if less than N strings have been accumulated. If N strings have already been accumulated, "minimum probability" is equal to the probability of the least probable of the N strings.

If the probability of the input partial string is less than "minimum probability", the process backtracks to the previous recursive level because <u>the probability of the input partial string will only decline further as its length increases</u>.

Block 160: If the partial string is, in fact, a "final" string, i.e. a string of the length which the user entered, then it is entered onto a list, typically organized as a heap, of most probable strings (block 190). Otherwise, the process advances directly to block 200.

Gilai discloses that the probability of the input partial string declines as its length increases. However, it is noted that the present invention does not concern the length of an input string, but rather the length of a data item in a data field in the search results. It is also noted that the present invention also does not concern probability. Rather, the present invention concerns excluding any data field having at lease one data item that exceeds a predetermined maximum length. It is further noted that the reason to exclude any data field having at lease one data item that exceeds a predetermined maximum length is that the long data items can be difficult for a user to remember when making a selection (see Specification, page 1, line 22), not that the data items cannot be recognized or pronounced by a recognition/synthesis engine.

Accordingly, the cited references, alone or in combination, fail to disclose or suggest each and every element of independent Claim 19 and 24. Applicants therefore respectfully submit that Claims 19 and 24 define over the prior art. Furthermore, as each of the remaining claims depends from Claims 19 or 24 while reciting additional features, Applicants further respectfully submit that the remaining claims likewise define over the prior art.

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Applicants thus respectfully request that the claim rejections under 35 U.S.C. § 103 be withdrawn.

CONCLUSION

Applicants believe that this application is now in full condition for allowance, which action is respectfully requested. Applicants request that the Examiner call the undersigned if clarification is needed on any matter within this Amendment, or if the Examiner believes a telephone interview would expedite the prosecution of the subject application to completion.

Respectfully submitted,

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